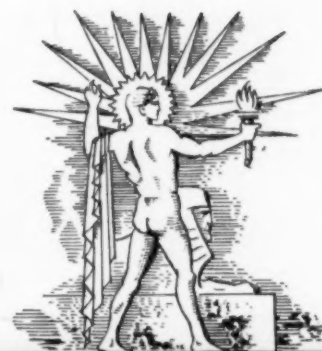


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SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •



December 16, 1939

New Antenna

See Page 392

A SCIENCE SERVICE PUBLICATION

Do You Know?

Quickfreezing a food changes about 75% of the water present to ice crystals in about 30 minutes.

Wild turkeys are not migrating birds, but they require a larger area on which to roam than most resident bird species.

Surgical instruments used by Dr. Charles McKnight during the American Revolution have been kept safely by his descendants.

Only five states have more than half their population on farms—North and South Dakota, Arkansas, South Carolina, and Mississippi.

Greater London's animal population includes about 40,000 horses, 9,000 cattle, 18,000 pigs, 6,000 sheep, 400,000 dogs, and 1,500,000 cats.

Cornell University has just sold an All-American world's record cow, which is the daughter of another All-American former world's record cow.

Newsprint made from castor plant pulp was used in turning out a recent issue of a student newspaper at Sam Houston State Teachers College in Texas.

Printing newspapers on paper made from old newspapers, by a promising process, was exhibited recently to the public at the Franklin Institute, Philadelphia.

QUESTIONS DISCUSSED IN THIS ISSUE

Most articles which appear in SCIENCE NEWS LETTER are based on communications to Science Service, or on papers before meetings. Where published sources are used they are referred to in the article.

CHEMISTRY

What new use has been found for castor oil? p. 392.

Where will engineers try to run an engine with glucose from corn as fuel? p. 393.

CHEMISTRY—BOTANY

With what chemical are plant wounds made to heal? p. 392.

CONSERVATION—ARCHAEOLOGY

How did prehistoric Indian farmers lick the drought problem? p. 391.

ENGINEERING

What sort of bearings require only water for a lubricant? p. 396.

EMBRYOLOGY

Where are scientists studying human life almost at its very beginnings? p. 387.

FORESTRY

Why do foresters encourage the cutting of Christmas trees? p. 399.

GENERAL SCIENCE

How can body temperatures be taken at the rate of four per minute? p. 387.

What climatic happening would make Holland high and dry? p. 389.

What is the expectancy of life for man as a race? p. 389.

What serious usefulness have marbles, balloons and toy-size trains? p. 390.

Who has been called the "John the Baptist" of social science? p. 396.

MEDICINE

By what path does meningitis invade the body? p. 393.

What chemical may some day rival sulfanilamide as a remedy? p. 393.

What foods prevent stomach ulcer? p. 392.

METALLURGY

Silver linings have deserted poetry for what industry? p. 393.

PHYSICS

What tremendous power is expected of California's giant atom smasher now planned? p. 394.

PHYSIOLOGY

In what way do plant tumors differ from animal cancers? p. 388.

Dakota farmers find that they can lessen wind erosion by leaving cornstalks standing all winter in narrow baricades.

Hiding and altering the appearance of shadows cast by buildings, is one of the problems of camouflage artists in the war zone.

Danish telegraph companies have set up a short wave radio telephone system in order to communicate with England—regular telephone connections were routed via Germany and Netherlands.

A governor's edict in 1641 required all Virginia colonists who held 100 acres of land to maintain a garden and orchard properly enclosed.

Fields containing 100 mice to the acre are not uncommon in Wisconsin, conservationists report; and a mouse eats 23 pounds of green food in a year.

Pinyon pines rarely produce a big crop of pine nuts in two successive years, but this year Grand Canyon pinyons have their second successive bumper crop, to the joy of Navajo Indians.

SCIENCE NEWS LETTER

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GENERAL SCIENCE

Science Advances Marked as Carnegie Researchers Report

New Breath Thermometer, "Tagged" Atoms for Research, New Cyclotron and Volcano Studies Disclosed in Summary

A BREATH thermometer that spots fever four times as fast as time-tried clinical thermometers and could be used on school children during epidemics; the discovery of diamonds in meteorites which fall to the earth from outer space; plans for a giant atom smashing cyclotron rivalling in size any in the world today; finding of molten lava deep beneath volcanoes, and a gigantic whirling of ourselves and the sun as the Milky Way rotates.

These are the latest research accomplishments of the Carnegie Institution of Washington, one of the world's leading institutions for scientific research with a \$35,000,000 endowment and annual budget of \$1,500,000, reported in its yearbook.

The new temperature-taking instrument works much faster than a thermometer and therefore will be useful during epidemics. With it, scientists of Carnegie's Nutrition Laboratory take the temperature of the air expelled from the lungs in a single breath. The patient refrains from talking and breathing through the mouth for two minutes. Then he draws a moderately deep breath, holds it for about five seconds, and exhales into a mouthpiece. The true body temperature can be told within 0.5 degree Fahrenheit by adding 2.2 degrees to the breath temperature.

Breath temperatures can be taken at the rate of four per minute. The speediest clinical thermometers require one minute to register the temperature and most physicians prefer to take two or three-minute readings.

For Flu Epidemic

During an epidemic of colds or influenza, this new instrument would be useful for taking temperatures of large groups of persons—children in school, or the whole office or factory staff in business—to determine which ones were probably coming down with colds or influenza and should be sent home to bed for protection of themselves and their associates.

New born babies whose mothers had diabetes have been saved by the Nutrition Laboratory incubator which helped them through their first struggles to breathe normally. The insulin and diet requirements of diabetics, especially those who have a high resistance to insulin and require large amounts of it, are being worked out by use of a helmet open-circuit respiration apparatus developed at the laboratory. When the patients breathe into this apparatus, the physician learns how fast they burn oxygen and computes the diet and insulin requirements.

Unsolved mysteries of history may be explained by the Carnegie Nutrition Laboratory studies of the diets of various races, such as one on the Navajo Indians just reported. Such studies may explain why races have survived either in spite of or because of their diets.

Diamonds bombarding the earth from outer space have been found by Carnegie's Geophysical Laboratory studies of small black grains in the Canyon Diablo meteorite in the U. S. National Museum. The diamonds were identified by their X-ray spectrum and optical properties.

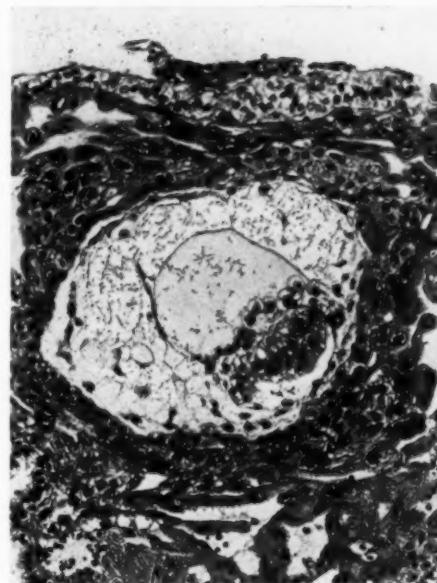
Could Find Depth of Lava

Studies of earth magnetism around the "baby" volcano, Santiaguito, near the extinct volcano Santa Maria in Guatemala, show that it should be possible to locate the outline and depth of the hot and potentially active lava beneath it.

A giant atom-smashing cyclotron weighing 200 tons and as large and powerful as any in the world today, is planned by Carnegie's Department of Terrestrial Magnetism.

The new atom smasher will be modeled after the 200-ton cyclotron now in operation at the University of California. It will be designed to yield alpha particles having energies of at least 32,000,000 electron volts.

By the time it can be placed in operation, within a year and a half or two years from now, advances in cyclotron



IN THE BEGINNING

Packed in the tiny dark area at the right of the lighter circle are all the infinite potentialities of the adult human. This Carnegie Institution photograph is of the Hertig human embryo only 11 days old, youngest ever seen. At the outside of the picture is the shell of the ovum, now eroding and consuming maternal tissues. The area is a primitive cobweb-like tissue which "conditions" the fluid in which the embryo itself is developing.

Life's Beginning

Deeper insight into the wonder of how a baby comes to be is provided by two human embryos in the earliest stages of development thus far known, which are being displayed at the annual exhibit of the Carnegie Institution of Washington.

These minute beginnings of human life were obtained during the past year at the Institution's laboratories of embryology, in Baltimore. They are now in process of sectioning for detailed microscopic study, which will be reported on in due time by Dr. Arthur T. Hertig.

The embryos are both of the eleventh day after conception, when by repeated division the original cell formed by the fusion of the parental elements has produced a hollow mass of cells known as the blastocyst. On the ninth day of development the blastocyst becomes attached to the uterine wall; the new Carnegie specimens therefore represent the second day after attachment.

An important fact already discovered about the new eleven-day embryos is their very close resemblance to those of monkeys and apes at a similar stage of development. It had hitherto been assumed that human embryos, even in the earliest days of growth, were considerably different from the embryos of zoological relatives.

The Carnegie Institution has had for some time one other embryo of nearly the same early age as the two new ones. This has been known as the Miller embryo. Discovery of two additional specimens makes possible comparative studies.

operation may make it possible to achieve particles having 50,000,000 electron volts of energy.

The new cyclotron will be located next to the two giant electrostatic accelerators which already deliver 1,000,000 and 5,000,000 electron volt energy atomic "bullets" for experiments in nuclear physics.

With these instruments, plus a large cyclotron, the department will be one of the best rounded laboratories in America for investigations on atomic structure. Other institutions may have either electrostatic generators or cyclotrons but none, so far, has both.

Moreover, the presence of the newly founded National Cancer Institute of the U. S. Public Health Service in Bethesda, Md., with its large supplies of radium available, means that the nation's Capital area will eventually possess the best research facilities in the country for all types of investigations on radioactivity and atom smashing.

Plans for the new cyclotron call for elaborate facilities for its use in biological and medical investigations using radioactive "tracer" elements to study obscure physiological processes in living plants and animals.

The department also studied the huge and mysterious earth supply current of 1,800 amperes which must continually be supplied to the earth as negative electricity, so that it may balance the 1,800 amperes of positive electricity known to be flowing continually in the atmosphere of the earth.

A "powerhouse" for this supply current may be the regions where electrical storms are prevalent. Continuous observations are being taken to build up a mass of data which will show the changes in supply current of the earth from year to year.

Study Plants

"Tagging" carbon atoms by making them radioactive, and then tracing them in their course through the food-making process of plants, physiologists and biochemists of the Carnegie's Division of Plant Biology are pushing forward into hitherto unexplored regions of plant science.

Radioactive carbon dioxide is manufactured and fed to the plants. Wherever the treated atoms of carbon go, they mark their course by the radioactive particles they throw off, just as a firefly, otherwise invisible in the dark, marks his course with his little lantern. Plant physiologists are thus learning many

things about the way plants make sugars, starches and proteins, which until now could only be guessed at.

Plants are studied while they are whole and alive. Much of the present knowledge of the food-making and food-using processes in plants has been gained by tearing them to pieces and extracting the enzymes with which they work. Now it is becoming evident that this method gets at only part of the facts: "It has been found that some of the components of the cell's photosynthetic apparatus had until recently escaped detection, because of their extreme sensitivity, particularly when in contact with the killed tissue of the plant. Similarly, many of the enzymatic reactions are drastically altered after the death of the cells."

The rotation of the sun about the center of the Milky Way has been explored

by the Mt. Wilson Observatory. The great galaxy system of stars to which our sun belongs is rotating. Latest figures show that the center of this circular movement is so distant that it takes 33,000 years for light (speeding 186,000 miles per second) to reach earth from there. The sun moves 180 miles per second in a circular orbit around this center, requiring 207,000,000 years for one revolution. Since the earth and all of us travel with the sun, we are moving at this rate also.

Discovery of some stars so extremely faint that they give out as little as one fifty-thousandth of the light of the sun emphasizes that our sun is a very average star, roughly midway between these faint bodies and the most luminous stars with 20,000 degrees Centigrade or about 30,000 times that of the sun.

Science News Letter, December 16, 1939

PHYSIOLOGY

Seeks Clue to Human Cancer In Induced Plant Tumors

Tumors Now Induced by Chemicals Are Part of Healing And Unlike Animal Tumors But Cancers May Yet Be Made

CLUES to the mechanism of cancer production in humans and other animals are now being sought in the plant world. Latest efforts to produce cancers in plants by the chemicals in tar which produce cancer in animals or by other chemicals were described by Dr. Michael Levine, Montefiore Hospital Biological Laboratory for Cancer Research, at the meeting of the Torrey Botanical Club in New York. Montefiore Hospital is the only hospital in the world which has a garden devoted to plant cancer studies.

Crown gall, the form of cancer which plants are known to harbor, is not analogous to human or other animal cancer, Dr. Levine said.

Cancer-causing hydrocarbons, which produce cancer in animals, poison plants but fail to produce cancers in them. Certain other irritating chemicals, such as indole acetic acid, indole butyric acid, naphthalene acetic acid and a series of scarlet red dyes, when applied to the injured surface of a plant, produce roots together with small tumors. These tumors, however, are not, in Dr. Levine's opinion, analogous to human or other animal tumors, either. The plant tumor,

he believes, is a part of a reparative and protective mechanism of the plant, analogous to inflammation in animals.

Dr. Levine expressed the hope that plants ultimately will be made to form tumors as a response to chemical substances. He implies that the plant cells will be so modified as to proliferate without limit, endowing them with a property now possessed by animal cancer. The production of malignant plant growths will throw light on the mechanism of cancer production in animals. The absence of blood and lymph streams, and lack of diversity of tissue types make the plant a suitable subject for the study of this important problem.

Science News Letter, December 16, 1939

● Earth Trembles

Information collected by Science Service from seismological observatories resulted in the location by U. S. Coast and Geodetic Survey and Jesuit Seismological Association of the following preliminary epicenter:

Tuesday, December 5, 3:30.1 a.m., EST

On the ocean bottom off the coast of Guatemala. Latitude, 14.5 degrees north. Longitude, 92.5 degrees west. Depth 80 kilometers.

For stations cooperating with Science Service, the Coast and Geodetic Survey, and the Jesuit Seismological Association in reporting earthquakes recorded on their seismographs, see SNL, Oct. 28.

GENERAL SCIENCE

Every Man Must Be Sociologist For World To Solve Problems

Man's Golden Age Ahead, Harvard Geologist Predicts; Good Will Would Aid Cooperative Solution of Problems

EVERY MAN must become his own sociologist if the world is to work out its destiny, Prof. K. F. Mather, Harvard University geologist, will warn scientists at the Christmas week lecture of the Society of Sigma Xi to be given in Columbus during the sessions of the American Association for the Advancement of Science. His address on "The Future of Man as an Inhabitant of the Earth" was issued in part in advance to facilitate its use by the press.

"Man is still in the stage of specific youth," Dr. Mather will predict. His 'golden age,' if any, is in the future rather than in the past. Human nature is still sufficiently plastic and pliable to permit considerable change, notably in this important area of attitudes and relationships wherein the increase of good will as a motive for action seems most likely to result in beneficial adjustments to the new factors in the environment.

"In seeking thus a satisfactory coordination of intelligence and good will, it becomes necessary for research scientists to give more thought than has been customary in the past to the social consequences of their work.

"As scientists they should continue to seek truth regardless of its consequences and to increase human efficiency in every possible way, but as members of society, as individual representatives of a species seeking future security as inhabitants of the earth, they must also do their utmost to ensure wise use of knowledge and constructive application of energy.

Social Science Not Unnatural

"There is a real difference between the so-called 'social sciences' and the 'natural and physical sciences' that has an important bearing here. It is not that there is anything 'unnatural' about the social sciences. Man is a part of nature, and the study of human society is just as truly 'natural science' in the real sense of the term as any other study. The difference arises from the peculiar factors and particular functions pertaining to the co-

operative way of life. Whereas the scientific use of things may be achieved through the efforts of a very small minority of the citizens, provided with adequate facilities for research, the scientific organization of society in a democracy can be achieved only when the majority of its citizens have the scientific attitude toward social problems and act in accordance with that attitude of mind. In other words, only a few physicists, chemists and technologists are required for the mastery of our physical environment, but for victory in the struggle with ourselves every man must be his own sociologist."

Expectancy 500,000 Years

Geologically the earth will probably be comfortable for man's inhabitation for scores of millions of years to come, Prof. Mather will continue. As one of the species of animals on the earth, man will have an average expectancy of existence as a race for 500,000 years but with his remarkable control over environment (which man alone possesses) there is no reason why this 500,000 year average cannot be greatly exceeded.

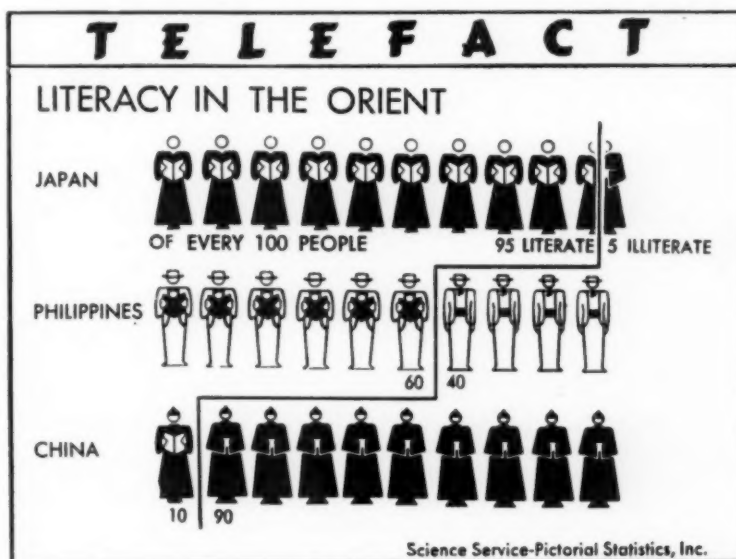
The disappearance of famous and powerful species of animals in the past has been due to environmental changes, Prof. Mather explains. Only man can dwell equally well on Arctic ice packs, in the Tropics, under the sea and in the air. Man has done this not by becoming specialized in his form but by taking his proper environment with him wherever he may be.

Great Ice Ages, such as those which have swept the temperate zones of the earth before, will probably come again, Prof. Mather points out. While we call our times a post-glacial epoch it may very well be really an inter-glacial epoch. Man, however, would now have no fears if the Ice Ages came again, for his control of environment would permit him to continue to live. It will need only an average drop in temperature of 10 degrees Fahrenheit to bring ice over most of Canada, northern United States and the Scandinavian countries.

Holland High and Dry

While much land now used would be covered with ice, the usable portion of the earth's surface probably would not be greatly diminished by this glaciation, the Harvard geologist continues. The removal of much water from the oceans to form this ice would lower the sea level and many countries, now nearly at sea level like Holland, would become high and dry.

In the reverse direction, warns Prof. Mather, a warming of the earth's average temperature would melt present Polar ice and raise the sea level by some 50 feet with disastrous (Turn to page 399)



GENERAL SCIENCE

Toys Aid Research

Models Submitted to Ingenious Tests Take the Guess Out of Engineering; Also Demonstrate Physical Forces

By EMILY C. DAVIS

IT'S A GOOD old Christmas joke—that one about Father buying Junior an electric train, because he (Father, of course) does like to play with trains.

But there are pleasant places in this workaday world where grown-up men play with beautifully made trains and boats, and with balloons and marbles and doll-sized "dishes," too, and they devote their days to it with no apologetic air at all. For their childish-looking toys are important.

As they tinker with perfectly proportioned miniatures, "doing it again" with a tireless repetition that would delight young Junior if he could ever get the grown-ups to be so accommodating, these sedate play-boys of science are demonstrating scientific principles or gauging weak danger points in diminutive models that will some day grow up into giant realities. It's Christmas all the year for them, people tell them; and nice work for those who get it.

How many ways of playing with toys scientists contrive to find, is rather impressive to those of us who keep in touch with the laboratory and museum world.

Most important, of course, are models of giant dynamos, dams, ships and other large-sized and costly equipment. Taking the guesswork out of industry is the mission of these toy-sized models. Nobody knows how much expense or how many lives these playthings save.

Toy-sized trains have helped engineers study the dangerous snake-like weaving motion of a high-speed locomotive tearing down a straight track. Far cheaper and easier to change structural design in these models than to change the trains themselves.

Can Watch Interior

By the ingenious idea of making models of telescope supports and other complex equipment out of plastic, engineers have found that they can not only test the works but see inside while they do it. They have to allow for differences in specific gravity and strength and elasticity which the light plastic displays under weight. But figuring this, they can measure what will happen to

the same equipment when it is turned out in heavy materials on a great scale, and subjected to loads. And seeing inside is a big advantage.

Of national interest is the model basin outside the national capital, in Maryland, where the Navy will soon be testing 20-foot model ships for the fleet of the future. The government has long had its quota of scientific employees who spend their days watching small airplanes in wind tunnels, and small boats in the old model basin at the Navy Yard, and miniature dams. The new model basin is one of the most strategically valuable scientific miniatures ever constructed. It will reproduce conditions to test the maneuvering power of ships, their speed, and other factors, saving many times the expense of its construction through the precautionary lessons learned.

Another government "toy" outstanding for completeness and usefulness is the 1,100-foot-long model of a 602-mile stretch of the Mississippi River. Using this remarkable small-scale imitation, Army engineers at Vicksburg can reproduce a Mississippi flood on miniature scale but with sinister reality, to test out effectiveness of flood control plans. To work this model requires 42 engineers.

Plays With Mud

Playing with mud pies and balloons is the occupation of one Bureau of Mines scientist. Sounds childish. But he is testing the strength of that amazing stuff called bentonite. Once best known as beauty pack clay, bentonite has recently revealed far more—or we might say even more—important possibilities.

Bentonite has the queer property of absorbing three to seven times its volume of water and expanding more than six times its original volume. You could seal dams and reservoirs with that, thought engineers. So, bentonite has become the modern prototype of Holland's boy who stuck his finger in the dike hole. Bentonite also is war-important. It seems capable of replacing mica in insulating electrical motors and dynamos, thereby answering the worry problem of where enough insulation is coming from.

Smaller than most doll dishes are the flasks, beakers, and crucibles of scientists

who engage in microanalysis. A whole set of equipment can rest in one hand. But with these toy-sized containers and with Bunsen burners and other equipment on equally small scale, a microchemist does the delicate work of making minute bits of matter reveal their chemical composition and their history.

Why juggle with this equipment that makes human fingers seem like Gulliver's in Lilliput land?

Because there are many instances in which only tiny amounts of material are available for test. G-Men at work on evidence from a crime, for instance, may have a few grains of dust or a trace of blood to work with. Schools soon may be using this doll-sized laboratory equipment. It saves material.

Marbles for Science

What looks like some new parlor game with marbles and an inclined runway leading toward a hummock-goal in a ring, is actually a physicist's invention to demonstrate what happens when scientists smash the nucleus of an atom. It is used to make a higher physics lesson intelligible to university students.

Marbles huddled on the hummock represent the atomic particles inside the nucleus of an atom. Marbles rolling down the runway to bombard the nucleus are like the bullets of a big atom-smashing machine in a physical laboratory. If the marbles have enough energy, they knock out nuclear particles, changing the atom. With too little energy, the marbles roll around the slope of the goal, missing it, just as real bombardments of the atoms are often repelled by the nucleus.

In real atom-smashing laboratories, this bombardment of atomic nuclei is used in making radioactive materials for treating cancer. It is used in transmuting elements. Tremendous forces are involved. But for school demonstrations, the marble game serves nicely.

A deceptively simple looking toy-man is Willie Vocalite, Westinghouse laboratory stooge, who looks like a tin man out of a fairy tale but who can do tedious jobs to save less efficient humans the bother. Willie's metal brain and body are controlled by photo-electric tubes—the same device that opens doors when your shadow falls on them or starts a drinking fountain bubbling when you bend over it. Demonstrating the magic-

like possibilities of this photo-electric cell, Willie will even get out of a chair when spoken to. Special feature of his anatomy is his taster, an "electrynx" so sensitive that it can record acidity of fruits by registering the action of one-millionth of an ampere.

Even Junior's Christmas train, mounted on a circular track, may and does give a lesson in science. A George Washington University physicist mounts a little train on a circular track suspended so that the track can move freely. Swing the track round at the right speed, and the train will stand perfectly still on the moving rails. And when you watch that, fascinated—as most observers are—you are getting an idea of how centrifugal force operates.

On a train, centrifugal force is what throws you against the seat, as you walk down the aisle and suddenly the train rounds a curve. Centrifugal force is a railroading problem in applied physics. It causes displacement of rails and wears out ties. Inertia is also demonstrated by the swirling track; showing how the train pushes back as it moves forward. Letting the track move freely makes it possible to show with how much force the train wheels push—something that could not be shown by simply running the train around on an ordinary immovable track. It is a nice experiment for Father to try, when he is tired of showing Junior how the Christmas train runs on the ground—if the train runs.

Science News Letter, December 16, 1939

METALLURGY

New Process for Alloying Coatings on Carbon Steel

METALLIC sparks from research: A new process for alloying coatings of stainless steel and other metals upon carbon steel sheets developed by Robert E. Kinkead, Cleveland consulting engineer. It fuses into a slab of steel by carbon arc chromium, molybdenum, nickel, titanium or silver.

The U. S. A. is building a tin smelting industry, pilot smelters getting under way, although we produce no tin. The idea is that it will be safer to get ore concentrates where we can, Bolivia for example, than to rely upon ore being shipped from southeastern Asia and South America to Holland or England or Singapore for refining and parcelled out to us as metal. One reason for Soviet acquisitiveness in Finland is Finland's nickel and copper production.

Science News Letter, December 16, 1939



SERIOUS GAME

It looks like marbles but it's really a demonstration model of an atom showing how the nucleus, containing many particles, (in center) can be bombarded and transmuted by other particles flung at it with high energy. The bombarding particles, in the model, are marbles rolled down the incline.

CONSERVATION—ARCHAEOLOGY

Soil Expert Studies Ideas Of Prehistoric Indians

With Irrigation Ditches, Check Dams, Semi-Terracing They Farmed In a Climate Worse Than the Dust Bowl

HOW America's prehistoric Indians managed to farm Southwestern country in a climate more rigorous than that of the Dust Bowl is being investigated by Dr. Guy R. Stewart of the U. S. Soil Conservation Service.

Dr. Stewart has discovered that Indian cliff dwellers who inhabited Mesa Verde Canyon, Colorado, in the Middle Ages had far more planning of their agriculture than any one suspected. Speaking before the Biological Society of Washington, he told of detecting traces of a three-mile ditch which ingenious cliff-dwellers dug along a four per cent. grade to bring down water, apparently from a reservoir, to spread over their corn-fields. Primitive check dams made of boulders controlled the flow of the water spreading to the fields. Indians who occupied Spruce Tree House, one of Mesa

Verde's now-famous and much-visited cliff-dwellings, benefited mainly by this foresighted planning. A twenty-year drought finally routed Mesa Verde's inhabitants.

Dr. Stewart has examined remnants of irrigation ditches, check dams, semi-terracing and other devices by which Hopi and Zuni Indians tried to conserve and control their precious water supplies. He doubts whether the Indians realized that they were also reducing erosion and saving the soil. But some fields abandoned by Zunis have since developed gullies 30 feet deep and 50 to 75 feet wide.

Studies of the old agricultural engineering add to knowledge of Indian experiences, and also may give information on the way certain soils and gradients behave when in agricultural use.

Science News Letter, December 16, 1939

MINING

U. S. Has First Year Without Mine Disaster

DIRECTOR John W. Finch of the U. S. Bureau of Mines rejoices in his annual report that "not a single major mine disaster occurred in the United States in the fiscal year ending June 30, 1939. This is the first year entirely free from mine disasters since accident statistics have been recorded." This record is all the more remarkable because increased use of electrical equipment and mechanized mining introduces hazards unknown in the first part of this century.

Science News Letter, December 16, 1939

CHEMISTRY

New Family of Chemicals Parade at New York Show

AT THE Chemical Show in New York where America's chemical engineering industries, so important in our daily life, show their giant machines and their new products:

That new family of chemicals, the nitroparaffins, were on parade at the "chemistry catalyzes commerce" exhibit assembled by the American Chemical Society's *Industrial and Engineering Chemistry* journal. These 17 organic chemicals and the numerous compounds that may be synthesized from them may be used as solvents for many of the most important substances used in industry today such as nitrocellulose, vinyl, alkyd and other synthetic resins, fats and dyestuffs. Mixed with alcohol they dissolve cellulose acetate and cellulose mixed esters, substances you use daily, base for safety photographic film, sheeting, etc. Producer: Commercial Solvents Corporation. Long names are attached to these chemical children of research. For example: there is a yellow liquid nitroparaffin known as 2-amino-2-ethyl-1,3-propanediol.

Any new use for castor oil to divert it from the use that you think of when you hear the name is news. Castor oil is being used to make paint, replacing the tung oil largely imported from China and now difficult to get on account of the Japanese invasion. As pressed from the castor bean, the oil won't dry properly. So it is necessary to dehydroxylate it, snatch out some hydrogen and oxygen (water, if you must know) atoms from its molecule, which makes it a drying, odorless, non-yellowing, oil comparable with tung oil. It is a 9-11 octa-

decadieneic acid, if you talk chemistry; Dehydrol, if you talk paint manufacture. Producer: Sherwin-Williams Co.

As a partner to the dehydrated castor oil, there is phenol resin, one of the most familiar synthetic plastics made from carbolic acid (phenol) and formaldehyde, modified into a pale, extra hard resin for making quick drying, water resistant varnishes, enamels and undercoats. Manufacturer: American Cyanamid and Chemical Co.

Science News Letter, December 16, 1939

MEDICINE

Ulcer-Preventing Factor Sought in Chick Studies

SEARCH for a stomach-ulcer-preventing substance in human foods, to be made in studies of chicks, will be speeded with the aid of a \$1,000 research fellowship donated by Eli Lilly and Company, to Stanford University School of Medicine.

Announcement of the gift and the award of the fellowship to Dr. Garnett Cheney was made by President Ray Lyman Wilbur of Stanford.

Certain human foods, such as butter-milk, whole milk and eggs, contain factors that will prevent the formation of stomach ulcers in chicks, experiments now under way have already disclosed. Gastric juice in chicks is similar to that in man, and by experiments with chicks Dr. Cheney hopes to be able to discover what other foods contain an ulcer preventing factor that may be useful for man.

Because of a possible relation between the chick ulcer preventing factor and vitamin K, Dr. Cheney will also investigate the effects on chicks of deficiency of this vitamin, which has proved valuable in checking the dangerous bleeding tendency in obstructive jaundice in human patients.

Science News Letter, December 16, 1939

RADIO

KDKA's New Transmitter Has 718-Foot Antenna

See Front Cover

WESTINGHOUSE station KDKA, which 19 years ago put on the air the nation's first regularly scheduled radio program, has a new 50,000-watt transmitting station at Pittsburgh. The 718-foot steel antenna tower, shown on the cover of SCIENCE NEWS LETTER this week, is claimed to be the world's tallest structure made by electric welding.

Science News Letter, December 16, 1939

IN SCIENCE

ENGINEERING

Topheavy Destroyers Will Be Steadied by Weighting

TOPHEAVINESS in 12 American destroyers, subject of much recent discussion, can be corrected by adding 40 or 50 tons of lead to the keel of each ship, rearranging stores, and removing some of the deck furnishings, Navy engineers state. Total cost for work on the entire group of 12 destroyers is estimated at between \$600,000 and \$1,000,000.

Weighting the keels may reduce speed by about half a knot. This, however, is not regarded as serious, since the ships, designed for 37-knot speed, actually made 39 knots on trials.

The destroyers of this group are among the most formidably armed craft of their class in the world. On a designed displacement of 1570 tons, they carry twelve 21-inch torpedo tubes, five 5-inch guns and a number of lighter anti-aircraft pieces. The 5-inch guns in all recently built American destroyers can also be trained for high-angle fire against aircraft.

Science News Letter, December 16, 1939

CHEMISTRY—BOTANY

Plant-Healing Acid Isolated In Pure Form

WOUNDS in plants are caused to heal by an acid which has been isolated in crystalline form by Drs. James English, Jr., James Bonner and A. J. Haagen-Smit of the California Institute of Technology, and for which they propose the name "traumatic acid." (*Science*, Oct. 6)

The substance has the chemical formula $C_{12}H_{22}O_4$, and is identical with the organic acid, 1-decene-1, 10-dicarboxylic acid. The three experimenters, using a solution of this acid synthetically prepared, induced rapid formation of healing tissue on the cut surfaces of potato tubers.

The discovery of the chemical nature of the wound hormone is announced briefly in *Science*, with the statement that a more detailed report will be published later.

Science News Letter, December 16, 1939

THE FIELDS

ENGINEERING

Locomotive At Fair Is Outstanding Achievement

THE GIANT, 608,170-pound locomotive "American Railroads," which millions saw at the New York World's Fair, was the outstanding development of railroading for 1939, according to a report submitted to the meeting of the American Society of Mechanical Engineers by its subcommittee.

"American Railroads," while it stayed in one place, covered thousands of miles on rollers to thrill World's Fair crowds. Designed to haul 1,200-ton trains at speeds up to 100 miles per hour, it was the cooperative undertaking of the Baldwin, American and Lima Locomotive companies.

Science News Letter, December 16, 1939

MEDICINE

Meningitis Invades Body Through the Blood Stream

CHICK EMBRYOS, too young by a week or more to crack their shells and emerge as downy chicks, have been giving medical scientists at Vanderbilt University Medical School, Nashville, important new information about dangerous meningitis.

When meningitis germs, called meningococci, are injected into the chick embryos, they get typical meningitis like that seen in human patients, Dr. G. John Buddingh and Miss Alice D. Polk report to the *Journal of Experimental Medicine*.

The meningitis germs enter through the nose and travel to the brain membranes by way of the blood, but do not go directly to the brain from the middle ear, cranial sinuses nor olfactory nerve sheathes, Dr. Buddingh and Miss Polk found from examining the chick embryos that had meningitis.

Scientists have previously thought that when patients got meningitis following middle ear or mastoid or sinus disease, the germs traveled directly from ear or sinus to brain, following nerve paths, instead of detouring via the blood stream.

The germs apparently do not live for

long in the blood, but may be protected during the time they are in the blood by certain of the body's germ-fighters called phagocytes, the chick embryo studies suggested. These germ-fighters engulf the germs, but the meningitis germs apparently can survive and even multiply into more germs within the phagocytes.

Both antiserum and antitoxin, used to help human patients ill with meningitis, protected the chick embryos against the disease, but the antiserum was more efficient.

Science News Letter, December 16, 1939

MEDICINE

Phosphorus in Possible Sulfanilamide Substitutes

ACHEMICAL compound that may prove as good a remedy against infectious diseases as sulfanilamide, with less toxic effects, is announced by the U. S. Public Health Service.

The compound, prepared by Drs. Hugo Bauer and Sanford M. Rosenthal, at the National Institute of Health, contains phosphorus instead of sulfur and is different in other ways from sulfanilamide. Three such compounds have been prepared, of which one, bis (4-dimethylaminophenyl) phosphinous acid, checked streptococcus infections in mice and had a low toxicity.

No human trials of these chemicals have been made yet, nor will they be, Dr. Rosenthal said, before more extensive laboratory investigations.

The object of the research, in which compounds with arsenic substituting for the sulfur of sulfanilamide were also made, is to find chemicals which either are better than sulfanilamide or are effective against germ infections which sulfanilamide does not check.

Science News Letter, December 16, 1939

GENERAL SCIENCE

Survey Is To Be Made Of Industrial Research

ANATION-WIDE survey of research in industry will be started immediately, Dr. Ross G. Harrison, chairman of the National Research Council, announced.

Raymond Stevens, vice-president of Arthur D. Little, Inc., Boston, consulting chemical laboratories, will direct the survey.

Funds for the important survey will be made available by the National Resources Planning Board.

Science News Letter, December 16, 1939

CHEMISTRY

Dust May Be Fuel for the Engine of the Future

DUST may be the fuel of the future for internal combustion engines, thus completing a cycle of development. For coal dust was a fuel used early in the development of what is now the diesel engine.

Coal dust is highly explosive, witness disastrous mine explosions. So are other kinds of dusts. Glucose, made from corn, would be adequate fuel for dust engines. Experimentation in this field is on the program for the new United States Department of Agriculture Laboratory at Peoria, Ill.

Science News Letter, December 16, 1939

METALLURGY

Silver Linings Predicted For Beer Cans of Future

SILVER is commonly considered a precious metal useful for coins, tableware, jewelry and, symbolically, as a lining for clouds. It is more in a class with gold than iron.

The white metal has been climbing out of the luxury ranks and looking for new jobs to do. It is shining up to industry. A research program undertaken by American silver producers has suggested unsuspected opportunities.

The beer can of the future may have a silver lining. An internal coating five millionths of an inch thick, which is enough, can be placed on twenty cans for a penny.

As a coating there is chance that silver can compete with tin to some extent. Several large companies are testing silver coatings to metals, plastics and glass. Various methods of application are being tried: Plating, electroforming, chemical reduction and vaporization.

There is hope that silver can be used to fight fungi that ruin or damage crops. Research has not progressed far, but a suspension of silver in bentonite, a kind of clay, may stick to the plants satisfactorily and do the fungus killing job.

More conventional are the uses of silver in electrical apparatus, particularly contacts, and in alloys with silicon, tin and lead. Lead-silver alloy may become important in airplane engine bearings, storage batteries and for soldering cans.

War-caused changes in metal prices has placed silver in a better economic position: Silver costs \$5 per pound avoirdupois, tin is 55 cents a pound, and mercury, a rival as a fungicide, is \$1.84.

Science News Letter, December 16, 1939

PHYSICS

Greatest Atom Smasher

**No Resting on Laurels for Prof. E. O. Lawrence;
He Plans 6,000,000-Pound Cyclotron of Amazing Power**

By ROBERT D. POTTER

THE MOST powerful atom smasher ever conceived by the mind of man, that would dwarf present similar devices 10 or 15 times and whose huge electromagnet alone would weigh between 4,000,000 and 6,000,000 pounds, is the new project on which Prof. Ernest Orlando Lawrence, newest Nobel Prize winner in physics, is now hard at work.

This device is an enormous cyclotron that would create atomic particles 50 times as potent as those from radium and which would permit a frontal attack on a colossal scale against the nuclei of the atoms.

The penetration of the secrets of the mysterious cosmic rays by literally creating them, to some degree, in the laboratory, the possibility of the production of practical atomic power and the transmutation of the elements of the kind that ancient alchemists dreamed about; all these are among the potentialities of the enormous cyclotron which Prof. Lawrence now seeks to build.

The youthful University of California professor, only 38 years old, was far from his laboratory even before the Nobel Prize committee recently gave public recognition to something which scientists everywhere have long realized; that the cyclotron is one of the most versatile devices ever invented for studying the constitution of matter.

He was out in the world of big business and finance arguing, explaining and planning for \$750,000 to make possible the construction of this 2000 to 3000-ton

giant. Even while this trip was in progress his laboratory already possessed two other cyclotrons, weighing 85 and 200 tons, the latter the largest in the world today and only just placed in operation within the last few months.

The huge magnet of a 2000-ton cyclotron would be the size of a small home, 34 feet long, 25 feet high and 13 feet wide. The pole pieces of the electromagnet would be nearly eleven feet across. Some 244 tons of copper would be required in the windings. In tentative plans this giant cyclotron to end all cyclotrons would be buried in a hillside near the Berkeley campus of the University of California to provide better shielding of the surrounding neighborhood from its piercing radiations.

What manner of apparatus is a cyclotron that any man has the temerity to ask for \$750,000 to construct one? And

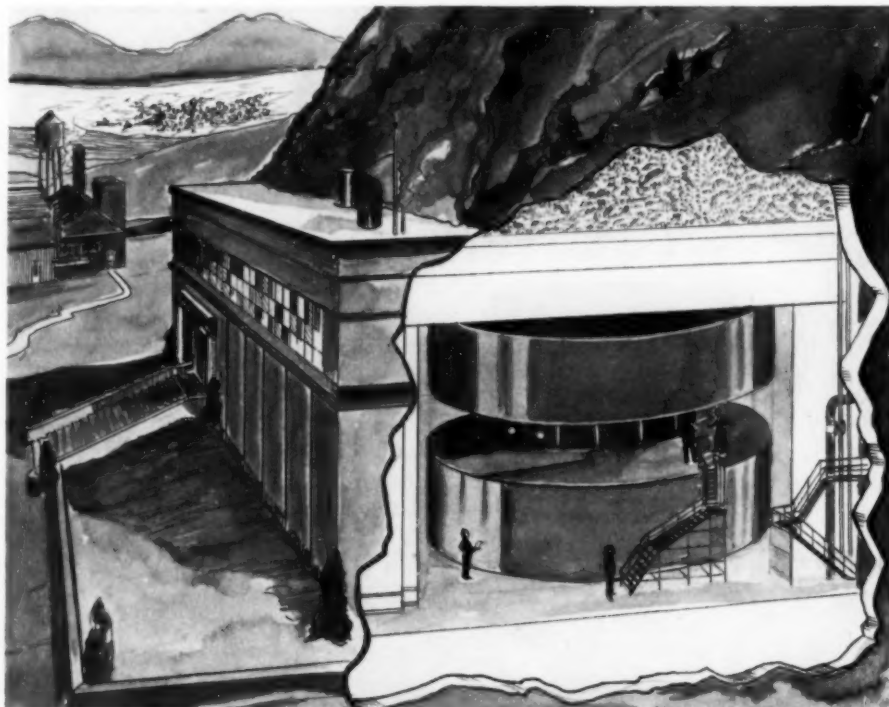
what worth has such an instrument that makes other men listen with reasonable sympathy to plans calling for research funds exceeded only by those needed to found a great astronomical observatory?

The answer to that story goes back to a September day in Berkeley, Calif., in 1930 when young 29-year-old Dr. Lawrence stood up before the nation's top-flight scientific body, the National Academy of Sciences, meeting there, and explained his hopes and dreams for an almost toy-like device for accelerating charged atomic particles. (See SNL, Nov. 18 for photograph.)

He hoped, Dr. Lawrence said, to build for a small sum a kind of magnetic and electric slingshot device that would whirl atomic particles around and around in spiral paths and, twice each revolution, speed them up by electrical "kicks."

His early plans envisioned the attainment of 1,000,000 electron volts of energy by a series of small electrical "kicks."

Known first as a resonance accelerator



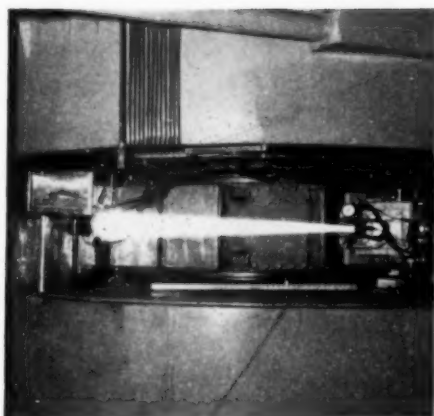
GIANT OF THE FUTURE

Artist's conception of the hillside laboratory which would house the enormous 3,000-ton cyclotron which Prof. E. O. Lawrence, newest Nobel Prize winner in physics, hopes to build at a cost of \$750,000. The cyclotron would be between five and six times as tall as a man. Its half-buried laboratory would be 1,000 yards from the nearest building which would be the control room shown at left.

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ENERGY

The most powerful beam of energy ever created by man, the 16,500,000 electron volt deuteron beam from the U. of C. 200-ton cyclotron. It projects nearly six feet out into the air.

this experimental model shortly gained the name of cyclotron. Based on its success came a larger instrument whose magnet weighed 85 tons. Alpha particles having energies of 16,000,000 electron volts were obtained with this apparatus.

The large electromagnet of this unit was originally built during the World War for use in a huge radio transmitter which the Chinese government planned to construct. Never delivered, the magnet lay unused and eventually—with alterations—went at the task of keeping atomic particles whirling in their spiral paths.

Out of the success of the 85-ton unit, which produced artificial radioactivity in a whole host of normally stable elements, came plans for a complete and separate radiation laboratory that would house a still greater 200-ton cyclotron.

This new unit, just completed, works so successfully that it immediately created particles having energies of 32,000,000 electron volts. With a few adjustments alpha particles having energies of perhaps 50,000,000 electron volts can probably be secured.

Ahead and beyond the range of this newest cyclotron and capable of attack only by a huge 2,000-ton cyclotron is the problem of attacking the barred domain of nuclei that defies all atomic projectiles having energies less than a hundred million electron volts. Physicists already know that such energetic particles do strange things to other atoms as they collide with them in a battering impact. In one place, in the cosmic rays, particles of this energy already exist and fleeting evidence of their capabilities are known.

But with a new 2,000-ton cyclotron such particles could be created at will

and be controlled whereas particles found in cosmic rays are rare and completely uncontrolled.

Basic point of attack with a giant 2,000-ton cyclotron would be to study the enormous binding energies which link protons and neutrons in atomic nuclei and thus hold matter together into a stable form which (in much larger amounts than an atom) we recognize as a table, a piece of salt, copper or any element or chemical compounds. The proton-neutron link can now be attacked only by indirect methods which, so far, have yielded relatively little about its nature other than a rough idea of its magnitude.

Prof. Lawrence feels that with a new and greater cyclotron a direct attack on the proton-neutron force could be affected. If the nuclear forces could be understood they might well be the key to developments of great practical importance. If this nuclear force can be liberated under controllable conditions the day when the energy locked up within atomic nuclei could be released would be at hand. A brief tantalizing hint has just this year been discovered by scientists, in the splitting of uranium atoms with the release of enormous amounts

of nuclear energy when bombarded with weakly energetic neutrons.

In very recent experiments performed in Prof. Lawrence's Radiation Laboratory by Prof. Malcolm Henderson of Princeton University it has been shown that the energy liberated amounts to 175,000,000 electron volts per atom of uranium. It takes only a bit of calculation to show that at this rate about 8 pounds of uranium would release energy equivalent to the 6,300 tons of fuel oil which a trans-Atlantic steamer like the *Queen Mary* carries in her bunkers on an Atlantic crossing.

The day when atomic power will become a reality is not yet at hand, make no enthusiastic mistake, but the possibilities for it are completely within the realm of reason. By the energetic bombardment of commoner substances than uranium with particles accelerated in a 2,000-ton cyclotron it is reasonable that perhaps other, more common elements likewise could be made to liberate their nuclear energy also.

Still another research possibility for a 2,000-ton cyclotron is the production of the transmutation of the elements on what would be, by present standards, a mass scale. Transmutation is possible



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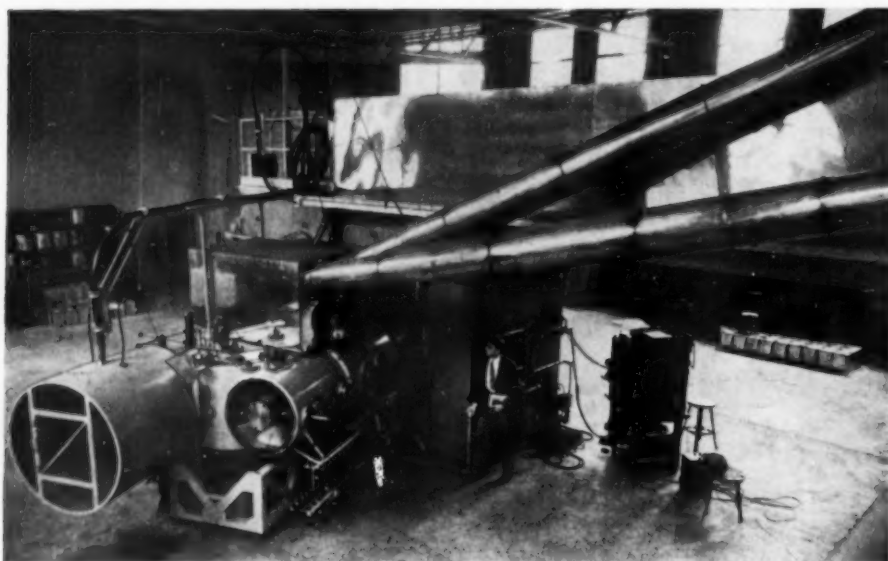
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PATHWAYS OF PARTICLES

New view of the world's largest and newest cyclotron, the 200-ton giant of the University of California, showing the vacuum chambers down which the atomic particles are speeded, with energies as great as 32,000,000 electron volts after they have been accelerated in great spirals in the cyclotron proper.

now with present cyclotrons and its evidence can be detected by the radioactivity produced in normally stable elements like beryllium, boron and almost all the rest of the familiar 92 elements of the periodic table. But the amounts are most minute. While the alchemists' dream of transmutation has been technically ful-

filled the production of transmutation on a practical scale is far ahead.

And yet the day may not be so far off at that for it is estimated that three years of construction only would be needed to build a new 2,000-ton cyclotron. It is much more than pure day-dreaming to say that such an instrument might not only discover a new, cheap and almost inexhaustible source of power but it might (shall one say as a by-product) turn out to be the long-sought philosopher's stone—a means of transforming base metal into gold.

Science News Letter, December 16, 1939

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ENGINEERING

Plastics Engineers Draft Plain Water As Lubricant

PLAIN ordinary water is now being used successfully as a lubricant for bearings in giant steel mill rolls and large ship propeller shafts through advances in the plastics industry, L. M. Tichvinsky, of the Westinghouse Research Laboratories, told the meeting of the American Society of Mechanical Engineers in Philadelphia.

Woven textile fabrics are impregnated with an organic binder and then treated by temperature and pressure to create these bearings, which require no oil or grease but perform efficiently when lubricated with water, which serves both as a cooling agent and as a lubricant.

Science News Letter, December 16, 1939

GENERAL SCIENCE

Marx "John the Baptist" Of Modern Social Science

An unofficial scientific ambassador from Great Britain to the United States is Julian Sorell Huxley, F.R.S., D.Sc., head of the London Zoo, grandson of the famous Thomas Henry Huxley of Darwin's day and an eminent biologist in his own right. Dr. Huxley comes to America as an exchange lecturer to represent British science at the Columbus, Ohio, meeting of the American Association for the Advancement of Science during Christmas week with a preliminary honoring banquet at Washington, under the joint auspices of the Association, the Smithsonian Institution, and of the Scientific Monthly.

KARL MARX, founder of the modern Socialist movement, was declared to be "the true John the Baptist of Social Science" by Dr. Julian Huxley, speaking in Washington.

Some thinkers claim for Herbert Spencer, contemporary of Darwin and the elder Huxley, the distinction of being the first to point toward an eventual application of the findings and methods of objective science in the problems of human society, but Dr. Huxley relegated Spencer to a position analogous to that of one of the Hebrew prophets, rather than that of a direct precursor.

"He demonstrated that social science was an inevitable development," Dr. Huxley stated, "but his notions of what form it would actually take and what methods it should employ were vague and essentially erroneous."

"Marx, on the other hand, developed a system directly based on social facts and directly applicable to them. He did

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not prophesy a Messiah, he indicated the Messiah. As natural scientists tend to undervalue Bacon because he himself did not make discoveries or work out experimental techniques, so social scientists tend to underrate Marx because his system is a dialectical one, ready-made and complete with answer to any problem, not sufficiently empirical and inductive for their scientific taste. It is doubtless true that, as occurred in the case of natural science, the social scientists must go their own way to work, regardless of doctrine or theoretical system; a precursor cannot take the place of the Messiah or the gospel he indicates. But at least Marx, like Bacon, gave expression to a new outlook and a new method of attack, and helped materially to alter the intellectual climate so as to make it propitious for the scientific workers in his field."

To the question why social science has taken so long to emerge into large-scale operation, Dr. Huxley returned two answers. First, the method of the controlled experiment, beloved tool of natural science, is impossible when working with human society. There are no societies among lower organisms sufficiently similar to human societies to serve as experimental material; man must be his own guinea pig in social experimentation. Moreover, nothing less than the whole of society will serve: results of experiments on limited groups of people, even in the most completely regimented state, would not yield dependable answers.

The second reason for the laggard state of social science offered by Dr. Huxley is the natural reluctance of the human mind to accept multiple causes for any phenomenon. No matter how complex the behavior of a human group, we always try to find "the cause" instead of seeking for a number of causes, of a complexity comparable to the results they produce. Also, man is always the victim of his own mental slant or bias; it is practically impossible for him to divest himself of inborn and acquired prejudices.

Methods will have to be worked out, especially by the application of mathematical analysis to the problems of multiple causation, and by the use of properly adapted propaganda for the overcoming of bias.

Science News Letter, December 16, 1939

Infantile paralysis accounts for about 29% of the crippling conditions in a New York hospital which specializes in treatment of the crippled.



"Didn't Little Boys Get Trains, Grandpa?"

"No, sonny, not when I was a little boy. You see, Santa Claus hadn't learned how to make electric trains, or automobiles, or airplanes then. I used to get a jackknife or a pair of mittens for Christmas. You're a lucky boy!"

BOYS and girls aren't the only lucky ones these days. Just check over the things you have, and ask yourself how many of them a family like yours could have had even a generation ago. Certainly not your radio or your electric refrigerator. Probably not your automobile, or even your electric lights. And there are thousands of other things—now available in a wide variety and at a reasonable price—that were unknown or prohibitively expensive only a few years ago.

Yes, we say we are lucky today. But it wasn't luck that made all these things available to us. It was American industry—its scientists, engineers, and workmen—who developed these new products, improved them, made them less expensive so that more millions of people can enjoy them.

More than any other one thing, the increasing use of electricity in industry has helped in this progress. For more than 60 years, General Electric has pioneered in making electricity more useful to the American people—in creating More Goods for More People at Less Cost.

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PHYSIOLOGY

Tone of Voice Changes When Breathing Helium

BECAUSE the quality of a person's voice changes when he is inhaling a helium-oxygen mixture, scientists at the Mayo foundation have discovered a new, relatively simple way of determining the percentages of nitrogen and helium in a mixture of these gases and oxygen.

Helium inhalations are used in treatment of asthma, and promise to be more widely used now that a new type of mask has been developed which reduces the high cost of helium treatments by allowing a gradual replacement of helium by the much cheaper oxygen. Early in the use of the mask for helium treatments, it was noticed that a person's voice sounded different when breathing helium, as if the pitch changed.

Investigations showed that the change in voice is not of the fundamental pitch but of the overtones. These investigations of the voice change involved determinations of the approximate velocity of sound in mixtures of helium and oxygen.

Having worked out a method and formula for determining the velocity of sound for any gas or gaseous mixture, the Mayo scientists, Drs. W. B. Dublin, W. M. Boothby and M. M. D. Williams, found they could construct a graph showing the relation between the velocity of sound in a gaseous mixture and the percentage of each gas present. The procedure is simple enough for practical application in analysis of helium-oxygen mixtures for nitrogen, for either medical or commercial purposes. Technical details appear in the Proceedings of the Staff Meetings of the Mayo Clinic.

Science News Letter, December 16, 1939

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Remittance of \$ _____ is enclosed.



OK'd Christmas Trees

CHRISTMAS trees were used freely and without particular thought of possible effects on national timber economy, until Theodore Roosevelt and Gifford Pinchot made the public forest-conservation-conscious something over a generation ago. Then a sudden revulsion of feeling set in. Everybody was shouting, "Woodman, spare that tree!" and vendors and users of Christmas trees came to be looked upon almost as public enemies. Unlimited cutting was opposed by equally unbridled demands to stop it.

Gradually, however, a sensible reaction from both extremes set in. Conservation began to mean sane and measured use instead of a panic-driven, miser-like refusal to expend anything. This ideal has not been fully realized by any means, but it is at least something toward which we as a nation are progressing. Chopping down a tree, even a little tree, is not necessarily a sin: it all depends on the circumstances.

● RADIO

"Adventures in Science" with Watson Davis, director of Science Service, over the coast to coast network of the Columbia Broadcasting System, will be augmented with special programs due to the many scientific meetings during the Christmas season.

Wednesday, December 20, 3:35 p. m. EST, Dr. Fritz Zwicky, California Institute of Technology, will describe great exploding stars, speaking from Los Angeles.

Monday, Dec. 25, 4:30 p. m. EST, Watson Davis will present the highlights of the year in science, speaking from Washington.

Tuesday, Dec. 26, 6:15 p. m. EST, Dr. Wesley C. Mitchell, retiring president of the American Association for the Advancement of Science, will discuss public relations of science. Introduction by Dr. Walter B. Cannon, president. From Columbus.

Friday, Dec. 29, 4:00 p. m. EST, Dr. F. R. Moulton, permanent secretary, A.A.A.S., will join with Watson Davis in interviewing leading scientists attending the A.A.A.S. meeting. From Columbus.

Listen in on your local station. Regular programs will continue each Monday, 4:30 p. m. EST, 3:30 CST, 2:30 MST, 1:30 PST.

The U. S. Forest Service and the various State conservation agencies now give definite approval and even encouragement to the use of Christmas trees, if they have been properly selected, and cut under forest-safeguarding supervision.

There are always many times more small trees in a young and developing stand of timber than can possibly grow up into logging size. Good forestry practice demands the thinning out of some of these, to give the remaining trees a chance to grow more rapidly.

Thinning operations require a good deal of labor, for which wages must of course be paid. Also, the removed trees must be disposed of. It is now accepted procedure to make these thinnings in time to ship the little trees for the Yuletide market, thereby finding an economic disposal for trees that would otherwise have to be stacked up and burned. The thinning operation thus becomes at least partly self-liquidating.

To identify Christmas trees obtained in conformity with good forestry practice, red certification tags are attached. Trees thus marked are not necessarily more expensive than similar trees less carefully obtained.

Science News Letter, December 16, 1939

From Page 389

results to great cities like New York now built nearly at sea level.

According to Prof. Mather, "The critical question for the twentieth century is: how can two or three billion human beings be satisfactorily organized for the wise use and equitable distribution of resources which are abundant enough for all but are unevenly scattered over the face of the earth? Clearly, the future of man depends upon finding and applying the correct answer to that particular, but far-reaching question."

How human society is organized forms perhaps the answer, Prof. Mather continues. Whether there shall be greater regimentation of society or its further organization along the principles of democracy must be decided.

"Both methods are being tried under a variety of conditions, and each has something to be said in its favor. But both cannot be equally conducive to the continuing existence of mankind, and one or the other must be selected as the basis for the future security of man."

Science News Letter, December 16, 1939

An Army tank recently ran down a deer in Wisconsin.

OFF PRESS DECEMBER 20th!

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Ethnography

TANGIER ISLAND, A Study of an Isolated Group—S. Warren Hall, III—*Univ. of Penn. Press*, 122 p., \$1.50. A study of sociological and ethnological features in one of the places in this country where a group worked out its own pattern of living uncomplicated—until recently—by outside influences. Tangier in the Chesapeake Bay now has its young liberals who introduced the freer "shore ways."

Science News Letter, December 16, 1939

Chemistry

WORKBOOK OF DRUGS AND SOLUTIONS—Luella C. Smith—*Mosby*, 99 p., \$1. A text to fit looseleaf binders on drugs and solutions which may be used for nursing arts courses or in microbiology.

Science News Letter, December 16, 1939

Language

ELEMENTARY CRYPTANALYSIS, A Study of ciphers and their solution—Helen Fouché Gaines—*Amer. Photo. Pub. Co.*, 230 p., \$3.50. Progressive study of ciphers and their solution which starts with the easy ones and works up to the complex intricate forms which have been used for secret communication by the governments of the world. A good book for the beginning but serious student of the art of cryptanalysis.

Science News Letter, December 16, 1939

Mathematics

APPLIED MATHEMATICS—James F. Johnson—*Bruce (Milwaukee)*, 434 p., \$1.40. Practical mathematics for high schools, trade schools and apprenticeship courses.

Science News Letter, December 16, 1939

Chemistry

THE MERCK INDEX (5th. ed.)—*Merck & Co.*, 1060 p., \$3.00. A compact encyclopedia for use by the chemist, physician, pharmacist, dentist and veterinarian. Some 5,900 descriptions of individual substances are given along with 4,500 chemical reactions, tests and reagents, formulae for culture media and staining solutions. A most valuable book issued on a nonprofit basis.

Science News Letter, December 16, 1939

Biology

KOONWARRA, A Naturalist's Adventures in Australia—Charles Barrett—*Oxford Univ. Press*, 315 p., \$3. Black swans, cassowaries, giant sea turtles, koalas, spiny anteaters, termite "skyscrapers", bottle trees, black folk—one comes out of the Antipodean bush with the feel-

ing that he has been on a journey to the Other Side of the Moon. The pictures compel credence, but still leave you feeling that "there ain't no sich place."

Science News Letter, December 16, 1939

Botany

FLOWERING SHRUBS OF CALIFORNIA AND THEIR VALUE TO THE GARDENER—Lester Rowntree—*Stanford Univ. Press*, 317 p., \$3. Descriptions and pictures of flowering shrubs from a state that is justly proud of its flowers. This book will be of especial value to those interested in shrub gardens, for it contains many practical cultivation hints.

Science News Letter, December 16, 1939

Agriculture

THE CARE AND HANDLING OF MILK (Rev. and enl.)—Harold E. Ross—*Orange Judd*, 417 p., \$4. An invaluable text for those who are studying the dairy industry; equally valuable as a reference work for those who are practicing it.

Science News Letter, December 16, 1939

Engineering

SILTING OF RESERVOIRS—Henry M. Eakin; Carl B. Brown, rev.—*Govt. Print. Off.*, 168 p., \$1. (U. S. Dep't of Agric., Tech. Bull. No. 524) A bulletin for engineers and conservationists. With text and statistical tables and many folded maps, it unemotionally drives home the lesson of the foolishness of building dams and then filling them up with mud from eroded lands upstream.

Science News Letter, December 16, 1939

Mineralogy

PRECIOUS AND SEMI-PRECIOUS STONES (3rd. ed.)—Michael Weinstein—*Pitman*, 192 p., \$3. Contains much information on the mining and working of the stones as well as descriptions of the gems themselves.

Science News Letter, December 16, 1939

Chemistry—Engineering

A. S. T. M. STANDARDS ON PETROLEUM PRODUCTS AND LUBRICANTS—*American Society for Testing Materials*, 336 p., \$2. Methods of testing, specifications, definitions, charts and tables.

Science News Letter, December 16, 1939

Chemistry

INTRODUCTION TO PRACTICAL ORGANIC CHEMISTRY—Frederick George Mann and Bernard Charles Saunders—*Longmans, Green*, 191 p., \$1.50. A text from England which is a smaller and more

simple version of the authors' Practical Organic Chemistry, already well-known in its field. Manipulation and the more elementary preparations are described in considerable detail.

Science News Letter, December 16, 1939

Zoology—Photography

EYES IN THE NIGHT—Tappan Gregory—*Crowell*, 243 p., \$3.50. Tappan Gregory has been trapping night-faring animals with flashes of light for many years. Those who have welcomed the occasional picture and fragment of lore he has given us will accord a tenfold welcome to this book, wherein he "shows all, tells all." For would-be emulators he generously provides detailed and specific information and instructions in the last two chapters.

Science News Letter, December 16, 1939

Engineering

ELECTRICAL TESTING FOR PRACTICAL ENGINEERS—G. W. Stubbings—*Chemical Pub. Co.*, 252 p., \$3.50. A comprehensive and yet simple manual dealing with the kind of testing required for the installation and maintenance of electrical plants and machinery.

Science News Letter, December 16, 1939

Mathematics

TUMMINELLO THEORY OF NUMERICAL ROOTS—Charles E. Tumminello—*Christopher Pub. House*, 178 p., \$2.35. How to extract roots of numbers (say the tenth root) with the aid of nothing more than a knowledge of algebra.

Science News Letter, December 16, 1939

Radio

TELEVISION AND SHORT-WAVE HANDBOOK—F. J. Camm—*Fortuny's*, 271 p., \$2.50. A text from Britain describing the construction and operation of television and shortwave radio sets.

Science News Letter, December 16, 1939

Bacteriology

MATHEMATICS IN BACTERIOLOGY—Otto Rahn—*Burgess*, 63 p., \$1.75.

Science News Letter, December 16, 1939

Archaeology

PREHISTORIC CULTURE UNITS AND THEIR RELATIONSHIPS IN NORTHERN ARIZONA—Harold Sellers Colton—*Northern Arizona Society of Science and Art*, 76 p., \$1.75. An analysis of Indian groups and their time sequence in northern Arizona, in the form of tables and factual summaries.

Science News Letter, December 16, 1939